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Summary of 22 Consecutive Years of Creel Census on Spirit Lake

TERRY JENNINGS[1]

Abstract. A creel census has been used on Spirit Lake annually since 1945. There have been two creel census methods used. Each method and the results obtained are discussed. Fish harvest, harvest rate, and angler use has fluctuated between wide limits. For an average year, bullhead, yellow perch, and walleye are creeled in that order of abundance. The catch rate has averaged 1.24 fish-hour for the 22-year period. Since 1960 there has been a 30 percent reduction in the average annual angler use on Spirit Lake.

A creel census has been made on Spirit Lake annually since 1945. Primarily these investigations have been made to assess fish harvests, harvest rates, and angler use.

Spirit Lake, Iowa's largest natural lake, is located in northwest Iowa. It lies in a drainage basin containing five additional Iowa lakes and several others in southern Minnesota. Except during periods of high water levels it is isolated from the other lakes. The basin was originally formed by glacial drifting and has a maximum depth of 25 feet. The lake is eutrophic and contains a large population of fish.

Catch and angler use statistics have been collected by two different methods. The first was based upon a simple fisherman interview, and was used until 1955. During the first eight years of study, boat liverymen interviewed fishermen using their facilities. The information was collected and assembled by the State Conservation Commission. Due to apparent biases, boat liverymen were dropped as interviewers during 1953 and since then all creel censusing has been accomplished by census clerks in the employ of the State Conservation Commission.

The second creel census method, a comprehensive type[1] by which estimates are made of total fish harvest and angler use, has been used since 1956. From 1945 through 1951 the census period included May and June. In 1952 the census period was expanded to include the months May through February.

FISH HARVEST

Harvest of fish by anglers has ranged between relatively wide limits (Figure 1). In the contact-type census total catch ranged from 34,526 in 1952 to 128,660 in 1948. In the comprehensive census angler harvest ranged from 105,821 fish in 1962 to 448,818 fish in 1960. The first year of creel census has been excluded because most certainly the effort spent interviewing fishermen was not comparable with effort spent in subsequent years.

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[1]Rose, Earl T. 1956. The quantitative creel census methods at Spirit Lake. Iowa State Conservation Commission Quarterly Biology Reports 8(2):21-30.

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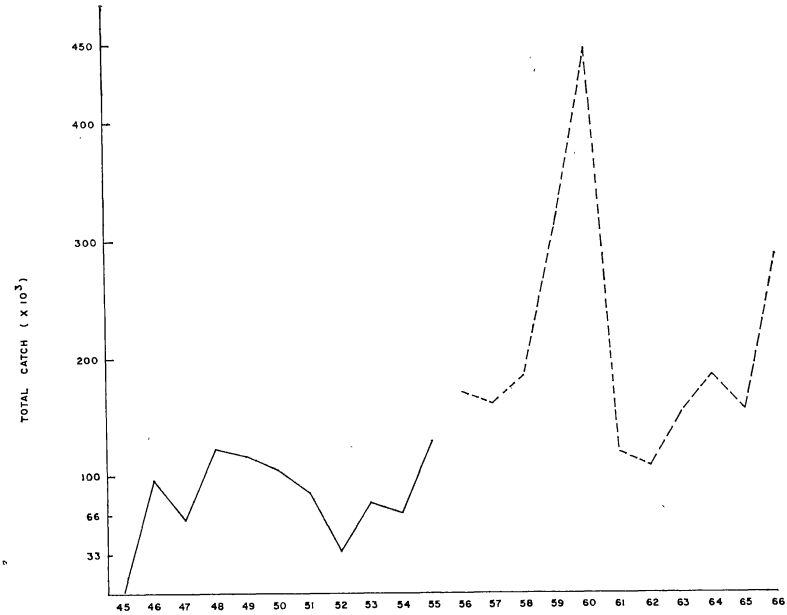

Figure 1. Angler harvest in Spirit Lake from 1945 through 1966.

Black bullhead (*Ictaluris melas*) dominated the catch 18 of 22 years. For individual years this species comprised between 8 percent and 87 percent of the total fish harvest. The bullhead take was proportionately greater in the contact census, averaging 61.9 percent, than in the comprehensive census when they comprised an average of 50.5 percent. Much of this difference is obviously the result of a two-month early summer census during eight years of the contact census. The bullhead harvest is highest during the spring months, then steadily declines throughout the summer to very low harvests during the fall and winter months. Modes in the bullhead harvest have occurred at five- and seven-year intervals. Bullhead harvest gradually increased until reaching a peak then sharply declined in subsequent years.

Yellow perch (*Perca flavescens*) ranked second in creel abundance 12 of the 22 years. This species annually comprised between 1 percent and 43 percent of the total fish harvest. The perch harvest was proportionately greater in the comprehensive census, averaging 21.5 percent, than in the contact census when they comprised an average of 16.4 percent. Much of the difference is the result of the two-month early summer census during eight years of the contact census. Perch harvest is lowest at the beginning of the fishing season and increases to the highest harvests during the fall and winter months. Since 1953 modes in yellow perch take have occurred at three- and five-year intervals.

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Generally, walleye (*Stizostedian v. vitreum*) is the third most abundant species creeled from Spirit Lake. Annually they have comprised between 3 percent and 28 percent of the total catch. They were proportionately more abundant in the comprehensive census averaging 16.4 percent than in the contact census when they comprised an average of 8.2 percent. Again much of the difference is the result of the two-month early summer census during the first eight years of contact census. Walleye fishing is best during the spring and fall months. Modes in walleye harvest have occurred at three- and four-year intervals.

Black crappie (*Pomoxis nigromaculatus*), bluegill (*Lepomis macrochirus*), smallmouth bass (*Micropterus dolomieui*), largemouth bass (*Micropterus salmoides*), white bass (*Roccus chrysops*), northern pike (*Esox lucius*), channel catfish (*Ictalurus punctatus*), sheepshead (*Aplodinotus grunniens*), and carp (*Cyrprinus carpio*) have also been creeled from Spirit Lake, but none has consistently comprised more than 1 percent of the total harvest.

In the comprehensive census the total estimated weight of the fish harvest has ranged between 15 pounds per acre and 50 pounds per acre, with a 24.7-pound-per-acre average.

Harvest Rate

During the past 22 years the average annual harvest rate has ranged from 0.59 fish per hour to 2.45 fish per hour and has averaged 1.24 fish per hour (Figure 2). In the contact census the average annual catch rate ranged between 0.61 in 1945 and 2.45 in 1950, with an average of 1.39 fish per hour. The comprehensive census average

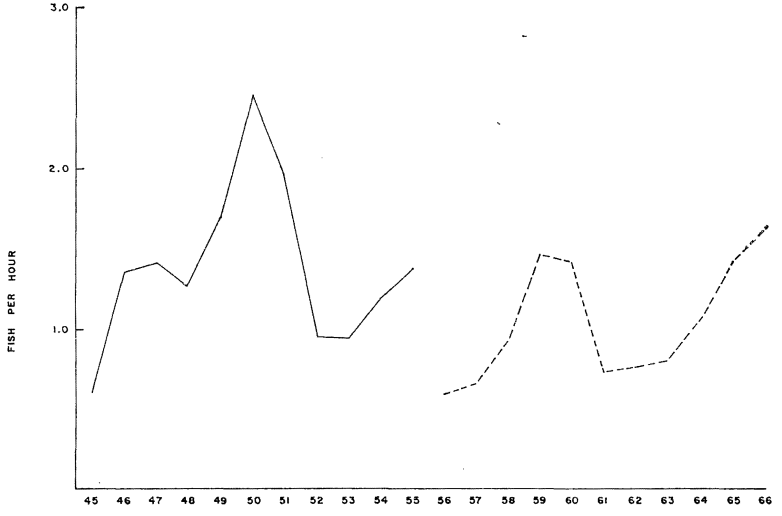

Figure 2. Angler catch success in Spirit Lake, 1945 through 1966.

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ranged from 0.59 in 1956 to 1.68 in 1966 and averaged 1.08 fish per hour. Much of the difference in harvest rate can be attributed to the two-month early summer census during eight years of contact census. Generally the harvest rate parallels the bullhead harvest. An average catch rate from Spirit Lake in excess of 1.00 fish per hour can be considered as evidence of good fishing.

Angler Use

Angler use has fluctuated between wide limits (Figure 3). For the contact census angler interviews ranged between 9,002 contacts in

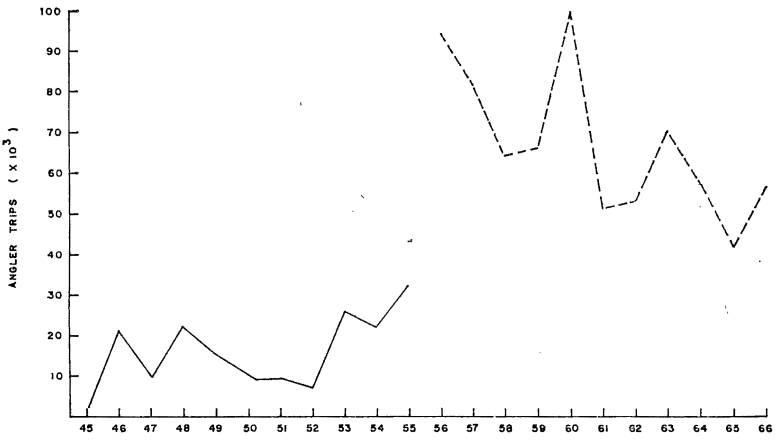

Figure 3. Angler use of Spirit Lake from 1945 through 1966.

1950 and 32,075 contacts in 1955. In the comprehensive census angler trips ranged from 42,352 in 1965 to 98,662 in 1960. The first year of contact census has been excluded because most certainly the effort expended interviewing fishermen was not comparable with effort expended the following years. Based upon recorded interviews, there was an abundance of anglers utilizing Spirit Lake's fishery resource during the contact census. Heavy angler use was observed in the comprehensive census until 1960 after which annual fishing pressure decreased 30 percent.

In the contact census the average fishing trip lasted 3.86 hours. In the comprehensive census the average fishing trip lasted 2.94 hours. Much of the difference can be attributed to boat liverymen biases in the collection of data during the first eight years of contact census.

Discussion

From no other lake in Iowa has 22 consecutive years of creel data been compiled. Two creel census methods have been used for data collection. A simple fishermen interview census was used from 1945

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to 1955 and a comprehensive census was used from 1956 to 1966. During the period of use of both creel census methods, fish harvest, harvest rate, and angle use fluctuated between wide limits. Generally, modes in fish harvest corresponded to modes in angler use. Statistically, however, the correlation is not significant at the 0.05 probability level ($r = 0.277$; 0.05 level $= 0.296$; 42 d.f.). Usually, modes in catch success corresponds with fish harvest modes. The correlation between fish harvest and catch success is significant at the 0.05 probability level ($r = 0.925$; 0.05 level $= 0.296$; 42 d.f.). There is no correlation at the 0.05 probability level between angler use and catch success ($r = 0.195$; 0.05 level $= 0.296$; 42 d.f.).

Black bullhead, yellow perch, and walleye are usually creeled in that order of abundance. Modes in the bullhead harvest occurred at five- to seven-year intervals while yellow perch harvest modes occurred at three- to five-year intervals and walleye harvest modes occurred at three- to four-year intervals.

Angler use was heavy throughout the contact census period and during the first five years of comprehensive census. Fishing pressure was lower during the last six years of comprehensive census. Much of this decline can be explained by the increased number of public fishing areas in Iowa during recent years.

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